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ABSTRACT

Based on the assumption that the kind of instruction provided during testing is important when examining children's zones of proximal development, two methods of dynamic assessment, "graduated prompt" and "mediation," were compared to each other and to static assessment. In dynamic assessment, the examiner sets up a learning environment in the testing situation and takes measures on changes from pre- to post-training performance and on the amount of instruction that was required from the tester for the child to obtain the posttest performance level. Developed originally for school-age children, the graduated prompt procedure includes a series of hints or prompts presented in a graduated sequence of increasing explicitness; children receive these aids in order to learn the rules needed to solve the problem correctly. In the mediational assessment method, examiners intentionally and directly teach the principles and strategies needed for task completion. The standard static method measures only the products of prior learning. A total of 60 children 4 to 6 years of age who were at academic risk participated. Findings revealed that children receiving either method of dynamic assessment were better able to perform a cognitive task independently than were children receiving static assessment. Children receiving the mediation method of dynamic assessment performed a transfer task better than did the graduated prompt and static assessment groups. (RH)

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ALTERNATIVE ASSESSMENTS OF HANDICAPPED CHILDREN

A Series of Technical Reports and Working Papers

Technical Report No. 2

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M. Susan Burns

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Comparison of "Graduated Prompt" and "Mediational" Dynamic Assessment and Static Assessment with Young Children[1]

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ABSTRACT

Two methods of dynamic assessment, "graduated prompt" and "mediation," were compared to each other and to static assessment. In dynamic assessment the examiner sets up a learning environment in the testing situation and takes measures on changes from pre-to-posttraining performance and on the amount of instruction that was required from the tester for the child to obtain the posttest performance level. Children receiving either method of dynamic assessment were better able to perform a cognitive task independently than were children receiving static assessment. Children receiving the mediation method of dynamic assessment performed a transfer task better than did the graduated prompt and static assessment groups.

The present research examines dynamic assessment with young children. In dynamic assessment the examiner sets up a learning environment in the testing situation, teaching the assessment task and examining children's responsiveness to teaching (Feuerstein, Rand, & Hoffman, 1979). A major goal of dynamic assessment is to examine children's zones of proximal development which Vygotsky (1978) defined as:

> the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. (1978, p. 86)

Studies on dynamic assessment have been conducted by a number of researchers (Brown & Ferrara, 1980; Bryant, 1982; Bryant, Brown, & Campione, 1983; Budoff & Corman, 1973, 1975; Campione, Brown, Ferrara, Jones, & Steinberg, 1983; Delclos, 1983; Ferrara, 1983; Feuerstein et al., 1979; Hall & Day, in press; Haywood & Maisto, in press; Keane, 1983). Most of the studies have focused on primary and secondary school children. In general, the results indicate that: (a) groups of children who receive dynamic assessment exhibit learning potential not detected in static assessment; and (b) performance on dynamic assessment varies with different categorical groups of children (e.g., culturally different, educable mentally retarded, learning disabled, normally developing).

Brown and French, (1979) and Mercer (1975) have explained the need for dynamic assessment procedures for young children, because existing traditionally static cognitive tests for preschool children have proven to be unreliable in detecting children who are performing in a mildly retarded range or who are at academic risk. They suggest that the reasons for their unreliability are: (a) the tests for young children are often not based on cognitive developmental theories, and thus the meaning of their results is difficult to interpret; and (b) the tasks are often not related to cognitive tasks given at a later age (Brown &

Ferrara, 1980; see also Bryant, Brown & Campione, 1983).

Delclos, Burns and Kulewicz (1985) and Vye, Burns, Delclos, and Bransford (in press) have examined the use of dynamic assessment with young children. Their research examines the use of dynamic assessment to identify children with learning problems, to prescribe educational interventions, and to implement assessment results. To date, their findings indicate that static and dynamic measures produce different estimates of learning. A substantial number of children in dynamic assessment successfully complete tasks when static measures suggest that they would not be capable of completing those particular tasks. Another finding has been that, in dynamic assessment, one can identify effective instructional techniques that can be used to remediate ineffective cognitive strategies and help children improve their learning performance. A final finding is that teachers rate their expectations of children's learning ability higher when they observe dynamic assessment than when they observe a static assessment.

Although the results on studies of dynamic assessment have been positive, there are several types of instructional procedures presently being used during dynamic assessments. This study compares two of those instructional procedures. This study is based on the assumption that the kind of instruction provided during testing is important when examining children's zones of proximal development because this may effect who reaches learning criteria in a particular assessment. The differences in instruction may be especially important for young children because adults and children often may not share the same definition of what should be done in a particular problem-solving situation (Wertsch, 1983). Moreover, the cognitive strategies exhibited by children during dynamic assessment might vary as a function of the type of instruction provided.

The purpose of the present study was to compare two dynamic assessment procedures, the graduated prompt procedure based on the work of Brown and associates (Brown & French, 1979) and the mediation procedure based on the work of Feuerstein and associates (Feuerstein, 1972; Feuerstein et al., 1979). Developed originally for school-age children, the graduated prompt procedure, based on Brown's approach, includes a series of hints or prompts presented in a graduated sequence of increasing explicitness; children receive these aids in order to learn the rules needed to solve the problem correctly (Brown & Ferrara, 1980). The other dynamic procedure is the mediational assessment method, based on Feuerstein's approach, in which examiners teach directly the principles and strategies needed for task completion (Feuerstein et al., 1982).

Both the graduated prompt and the mediational dynamic assessment methods measure how children perform tasks when help is provided, rather than measure only the products of prior learning as is done in static testing. Both also assume that children who have similar scores on static assessment will vary in their performance, as a function of their zone of proximal development, when tested with dynamic assessment. Both procedures view the amount of help given as a critical part of the assessment (e.g., see Campione, Ferrara, & Bryant, 1983). Nevertheless, the procedures differ with respect to the kind of adult help given. Both procedures use instruction to bring about children's learning of specific tasks, but this instruction differs for the two procedures.

In mediational dynamic assessment the tester intentionally teaches the principles and strategies needed for task completion. The tester uses a directed mediational teaching style that is interactional and related contingently to the child's task performance as defined by Wood (1980). For example, if a child needs help on scanning all the materials, the tester gives that type of help at a

level of directness needed by the child. In the graduated prompt dynamic assessment procedure, prompts are arranged in terms of their degree of explicitness. A general, relatively inexplicit prompt might be "Do you remember how you did the last one? How did you do it?" whereas a more explicit one might be "Put this red cut-out on your solid color." Children receive increasingly explicit prompts only when needed, the question of whether to give additional prompts is therefore contingent on the child 's performance. However, the exact nature of the prompts is not contingent on each child's performance since these are determined prior to testing. This pre-determination of prompts facilitates the standardization of the testing procedure yet also makes it less response-contingent than is the mediational approach.

In the present study, the graduated prompt method based on the work of Brown and associates (Brown & Ferrara, 1980; Brown & French, 1979) and the mediation method based on the work of Feuerstein and associates (Feuerstein et al., 1982; Feuerstein et al., 1979) are compared to each other and to a static testing method. Dependent measures are (a) independent task performance on the task that was taught and (b) performance on a transfer task. Children in both dynamic assessment groups were expected to learn the task when instruction was provided, whereas children in the static assessment group were not expected to learn the task. Similarly, children in the static assessment group were not expected to generalize to the transfer task because they had not learned the initial task. It was also expected that the two types of dynamic assessment (graduated prompt and mediational) would have differential effects on independent performance and on transfer, with the performance of children in the mediational group surpassing that of children who received the prompting assessment. An important reason for this prediction is that the contingent instruction characteristic of the mediational procedure should increase the

probability that the tester and child share the same task definition (Wertsch, 1983) and that the strategies suggested by the tester will be more appropriate for each child (e.g., see Wood, 1980). The amount of time that the children spend in instruction was not expected to account for children's performance on the independent task and the transfer task.

METHOD

Participants

One hundred and twenty-seven 4- to 6-year-old children participated in screening for this study. Generally, children were chosen to participate because their teachers felt that they had learning problems. Children with known organic handicaps were not included in the study. All children received a cognitive screening (Kaufman, 1977) and those whose test scores indicated academic risk were given full cognitive assessment with the McCarthy Scales of Children's Abilities (McCarthy, 1972). Those children whose scores fell within the "at academic risk" group (McCarthy GCI scores between 60 and 89) were included in the study.

Sixty 4- to 6-year-old children who were at academic risk participated in the experimental testing sessions. These children were randomly assigned to three treatment groups: (a) the graduated prompt method, (b) the mediational method, or (c) the standard static method. Demographic information on these subjects are presented in Table 1. No differences were found between the three treatment groups on sex, race, placement, chronological age, mental age, McCarthy GCI, and McCarthy Perceptual Performance Subtest.

Insert Table 1 about here

Materials

The cognitive task used in these assessment procedures is an adaptation of the Stencil Design Test-1 of the Arthur Point Scale of Performance Tests Form 1940 Revision (Arthur, 1947). Originally designed for children 5 years of age and older, the test was changed for these young children by making seven

new items. Each item consisted of a design that required putting two stencils together. Arthur's initial items, which were also made with two stencils, were administered along with the seven new items. The Arthur items (i.e., designs using more than two stencils) were omitted.

This stencil task was chosen because (a) it is similar to ones used to test older children (Arthur, 1947; Feuerstein et al., 1979) and (b) identifiable cognitive processes are needed for task completion (Burns, 1985).

The transfer task was the Animal House matching board subtest of the Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1967). This task was chosen among others that had been pilot tested because (a) it is age appropriate and has national norms, (b) there is variability in children's scores on this test, (c) it is usually not taught in preschool classrooms, and (d) it includes many of the cognitive processes examined in the stencil design task.

Procedures

All children were tested during two sessions. In the first session they received the McCarthy Scales of Children's Abilities. In the second session all children received the Animal House test as a pretest, groups of children then received stencil teaching in one of two dynamic assessment groups (graduated prompt or mediation) for five stencil items and the third group received static presentation of those same five task items. After receiving the assessment, all children were given four different stencil task items as a measure of their independent performance, and the Animal House test as a transfer task. Comparisons were made on (a) the children's performance on independent items of the trained task (stencil design) and performance on the transfer test, (b) behavioral manifestations of the cognitive functions and deficiencies that the children exhibit on independent task performance and on transfer test performance, and (c) total time of the assessment procedures for children in

each procedure.

Graduated prompt assessment procedure. The procedures, based on the work of Brown and her associates, include a series of hints or prompts that are arranged in a graduated sequence of explicitness. These graduated prompts are used in teaching the rules needed for task completion (Brown & French, 1979). One prompt is given to a child each time she or he cannot complete the task. The order of prompt presentation was determined by using the explicitness ratings of 12 teachers and 8 professional staff members who work with preschool children. The prompt procedure was developed with consultation from Brown and Campione.

As mentioned earlier, in the graduated prompt condition children were given prompts sequenced in order of increasing explicitness. Examples of the first few prompts are:

> 1. DO YOU REMEMBER HOW YOU DID IT WITH THE LAST ONE? If so, the tester should ask HOW DID YOU DO IT? If not, point out and label the solid cards and the cut-outs, then explain that a solid and a cut-out are put together to make one that looks just like the model.
>
> 2. LOOK AT ALL THESE CARDS (the tester should point to each card). EVERYTHING YOU NEED TO MAKE THIS ONE IS HERE. SEE IF YOU CAN MAKE ONE THAT LOOKS JUST LIKE THIS ONE.

Examples of the more explicit last two prompts are as follows.

> 8. THIS (name the color of the solid) ONE IS PART OF THE MODEL. (Place the correct solid in the center of the board if it is not already there.) LOOK AT THIS PART OF THE MODEL (point to part that looks like a cut-out). FIND A CUT-OUT FROM HERE (point) THAT LOOKS JUST LIKE THIS PART OF THE MODEL. SEE IF YOU CAN MAKE ME ONE THAT LOOKS JUST LIKE THE MODEL.
>
> 9. PUT THIS (name color) CUT-OUT ON YOUR SOLID COLOR. SEE, YOURS LOOKS JUST LIKE MINE.

An example instruction is in Table 2. Detailed task instructions can be obtained from the author.

Insert Table 2 about here

Mediation assessment procedure. The mediation procedure, based on the work of Feuerstein and associates, includes contingent mediated teaching of the principles and strategies needed for task completion (Feuerstein et al., 1982). The amount and type of mediation provided varies with different children according to their needs. Children received mediation that was interactional and response-contingent. They were first familiarized with the materials (labeling the shapes and colors of the cards and comparing the cut-outs to each other). Then the children were taught the combination rules needed to put the stencils and cut-outs together and finally they were taught how the model was used. Children were given more elaborated instruction based on the nature of their errors. For example, if their error indicated that they could find the correct shape of a cut-out but not the correct color, the tester would help the child learn to differentiate between colors.

An example interaction is in Table 3. Detailed task instructions can be obtained from the author.

Insert Table 3 about here

RESULTS

Dependent variables were children's: (a) score on independent performance, (b) score on pretest and transfer posttest, (c) observed off-task behavior, and (d) amount of time in training.

Independent Task Performance

Children were tested with four new stencil items that were at the same difficulty level as the four training items (difficulty level was assessed with pilot work on 79 children). Children in the graduated prompt and mediational methods were expected to have more correct items than children in the static method. Children in the mediational method were expected to have more correct items than children in the graduated prompt and static methods. When the data

Insert Table 4 about here

were analyzed with all children who participated in the study, the following results were found on independent task performance. In the 3-group (static, graduated prompt, mediation) analysis of variance in which independent task performance was the dependent variable, there was a significant Main effect for Group ($F = 8.44$, $df = 2/57$, $p < .01$). Because directional hypotheses were made between the groups, multiple t tests (one-tailed) were performed across groups to determine whether the 3 groups differed. As shown in Table 4, the graduated prompt assessment group scored higher than did the static assessment Group ($t = -1.89$, $df = 38$, $p < .05$). The mediation assessment group scored higher than did the graduated prompt assessment Group ($t = -2.98$, $df = 38$, $p < .05$).

Transfer Performance

Children's transfer task performance was measured on the Animal House matching board. Differences in transfer scores (between the test given prior to assessment/training and the test after assessment/training) were expected to be greater for children in the mediational and graduated prompt methods than for children in the standard method. And pre-to-post-transfer-test performance differences were expected to be greater for children in the mediational method than for children in the graduated prompt method.

Insert Table 5 about here

On the 3 x 2 analysis of variance (Treatment Group by Trial) with transfer task performance as the dependent variable, there was a significant main effect for Trial (F = 24.92, df = 1/57, $p < .01$) and a significant Group X Trial Interaction (F = 6.30, df = 2/57, $p < .01$). Both graduated prompt assessment (t = -4.62, df = 19, $p < .01$) groups had significant pretest to transfer posttest gains, while static assessment did not have significant gains. However, as shown in Figure 1 and Table 5, on the transfer posttest

Insert Figure 1 about here

performance, the mediation group scored higher than did both the static and graduated prompt groups and there was not a significant difference between the static and graduated prompt groups.

These transfer data were also analyzed for children who reached learning criterion in their independent performance on the stencil design task. The criterion for learning was that children had at least three out of the four

independent performance items correct. There were seven children who reached criterion in the graduated prompt group and twelve children who reached criterion in the mediation group. These data were consistent with the overall transfer score results. The 2 x 2 analyses of variance (Treatment Group by Trial) on transfer scores results showed a significant effect for trial (F = 12.62, df = 1/17, $p < .01$) and a Group by Trial Interaction (F = 6.96, df = 1/17, $p < .05$).

Observed Behavior

Expectations in this area were expected to be similar to those on independent and transfer performance. Average reliability coefficient for observed behavior on eight randomly assigned children was .96. Frequencies of behavior were low and no significant effects were found.

Training Time

There was no reason to expect that there would be a significant relationship between the amount of time required to teach children and their independent task or transfer test scores, but time data were important to examine in order to ascertain whether results were systematically related to the amount of time on task. Correlations were computed between all children's scores on independent performance and transfer posttest performance scores and the time that the children spent in training. Neither correlation was significant (independent performance with time r = -.05 and transfer posttest performance with time r = -.15). The average time spent in each type of training was 6.15 minutes for children in the static assessment group, 23.10 minutes for children in the graduated prompt group and 23.30 minutes for children in the mediation group.

Testers' Adherence to Procedures

Testers' adherence to the graduated prompt and mediation assessment procedures was examined using Tester Criteria forms. A tester accuracy score was obtained for each testing session. Testers were required to obtain a score of at least 85% accuracy in order to include the session in the experiment. A score of at least 85% was obtained for every child tested, therefore none was eliminated.

One-fourth of the children were tested by an examiner who did not know the hypotheses of this study (blind examiners). No systematic differences in accuracy were found across testers. A reliability check by a second rater of tester accuracy on 10 of the testing sessions showed that the recordings on the Tester Criteria Forms were reliable (r = .93).

DISCUSSION

The goal of this study was to compare the instructional components of two types of dynamic assessment (prompt and mediational) with one another and with static assessment. Analyses of children's independent performance and transfer task performance revealed that the three types of assessment produced different results.

Consider first the comparison between the dynamic forms of assessment and static assessment. A major reason for using dynamic assessment is that it provides a more sensitive indication of student's strengths and weaknesses than does static assessment. In Vygotsky's terminology, it provides a measure of the child's zone of proximal development as defined earlier.

Analyses of children's independent performance and transfer task performance reveal a direct relationship to the type of training provided in assessment. On independent performance and on transfer test performance, the mediation assessment group scored higher than did the static assessment or graduated prompt assessment groups. On independent performance, but not on transfer test performance, the graduated prompt assessment group scored higher than did the static assessment group. These results support the claim that children generalize learning in mediational assessment (Feuerstein et al., 1979), emphasizing the importance of mediation for transfer.

Comparisons of the prompt and mediational forms of dynamic assessment also revealed differences in performance. In particular, the transfer results for the prompt group are consistent with those found in the graduated prompt dynamic assessment studies with mildly mentally retarded children (Campione et al., 1983; Hall & Day, in press), that is, as the transfer task becomes more dissimilar to the task that was taught, mentally retarded children had less

transfer. Campione et al., (1983), and Hall and Day (in press) did not compare graduated prompt dynamic assessment to static assessment. Therefore, it is not possible to ascertain whether the mildly mentally retarded children in their studies performed better on transfer when they received graduated prompt dynamic assessment than they would have on transfer if they had received static assessment.

Note that in the present study the prompt and mediational groups differed in the amount of improvement that they exhibited following intervention. At first glance, this may seem to be an inappropriate measure for comparing the two forms of assessment. For example, Brown et al., note that their emphasis is "not how much improvement one can bring about via intervention, but rather how much aid is needed to bring about a specific amount of learning" (Campione, et al., 1983, p. 4). Nevertheless, the present results illustrate that the nature of the aid must be considered when attempting to measure the amount of aid.

It is important to note that the purpose of the present study is to determine whether there are observable effects of the two different types of dynamic assessment rather than to attempt to decide which one is "better". The important question is "better with respect to what?" For example, Brown and colleagues are well aware that the type of mediational training utilized herein generally produces better transfer than does training more similar to their prompting procedure—the mediational type of training is more consistent with a "metacognitive" perspective (e.g., see Brown, Bransford, Ferrara and Campione, 1984; Campione, Brown and Ferrara, 1982). Nevertheless the most effective type of training may not be the most optimal type of assessment. For example, it is possible that the less-instructionally-rich procedures used in the prompting method provide a more realistic prediction of children's performance in

everyday classrooms because the latter also contain less child-contingent instruction than is characteristic of the mediational approach. On the other hand, children who receive only prompted instruction may be erroneously classified as "non learners" or "poor transferers" even though they might become able to perform effectively given a mediational approach.

FIGURE 1

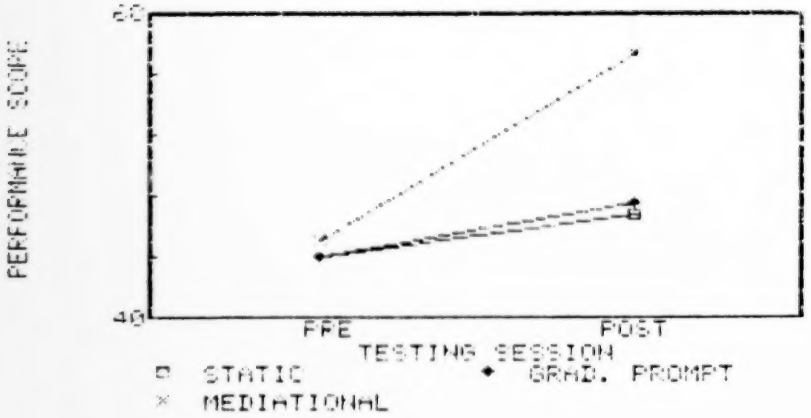

Figure 1. Assessment Group (Static/Graduated Prompt/ Mediational) by Trial (Before Training/After Training) Interactions for Transfer Performance Score

TABLE 1

DEMOGRAPHIC INFORMATION

PARTICIPANTS IN STUDY

Group Variable	Static	Graduated Prompt	Mediation
Sex (Number)			
Males	11	8	10
Females	9	12	10
Race (Number)			
Blacks	16	14	15
Whites	4	6	5
Placement (Number)			
Special Education	1	1	1
Preschool	12	12	12
Kindergarten	7	7	7
Chronological Age			
X	61.60	60.95	62.80
SD	7.06	7.76	9.70
Mental Age			
X	49.80	48.70	50.30
SD	7.24	6.99	8.96
McCarthy - GCI			
X	80.45	79.80	79.10
SD	7.05	7.48	6.73
McCarthy - Perceptual Performance Subtest			
X	35.05	34.25	34.90
SD	11.91	13.34	14.57

TABLE 2

EXAMPLE OF GRADUATED PROMPT INSTRUCTION

T:	here's the first one/ it's real pretty/ (try and put) make one that looks just like mine right here/ (presents model, points to work area)
P:	(places cut out in work space, an incomplete production, looks to T)
T:	'finished/
P:	(nods yes)
T:	ok'/ does yours look just like mine/
P:	(looks, shrugs shoulders=I don't know)
T:	does it look just match it/
P:	(moves cut out from work space and places it on model)
T:	no/ (doesn't consider the above move an action) you leave yours there though/ (referring to work space) 'ok/ you make yours down there and mine's up here/ (points)
T:	does yours look just like mine/
P:	nu huh (=no)
T:	no/ can you make it look like mine/
P:	(nods yes)
T:	go ahead finish it/
P:	(uni) hole (uni)
T:	all right'/ watch/.let's put this back/ (returns cards) do you remember how we did the first one/
P:	what/
T:	remember how we did this one/ (presents teachers demonstration model)
P:	(nods yes)
T:	all right'/ remember/ look we looked down here and we took one of the solid cards and put it down/ then we looked up here and took one of the cut out cards and put it on top and that made it look just like the model/ ok'/ now you try to make this one/
P:	(picks up cut out, reaches for second cut out) this 'one/
T:	make it look like mine/ 'ok/
P:	(picks up solid, returns it, takes solid again, reproduces the model)
T:	now does yours look just like mine/
P:	(nods yes)
T:	now it does/ doesn't it/ good for you/ it's got a blue solid and a white cut out/ doesn't it.../ good work/ wow/ that was quick/ (returns cards) you learned that quick/

TABLE 3

EXAMPLE OF MEDIATION INSTRUCTION

T: you make it look just like mine right here/
P: hard to pick up (reaches for cut out, places in work space)
T: are you finished/ (points to cards)
P: (nods yes)
T: (does yours look) just look down here/ (P throws head back) look down here/ does yours look just like mine/
P: (nods yes)
T: not quite.../
T: how many colors are there in mine/ (points to model)
P: yellow/
T: 'and/
P: red/
T: yellow/ and what is that/
P: re... oh it got red on the yellow right here/ (pointing to tiny spot)
T: oh well that's just a little scratch or something/ but there is yellow/ and what color is this/
P: green
T: ok'/
T: now/ what colors do you have on yours/
P: green/
T: where is your yellow/
P: (reaches for solid)
T: you don't have any yellow/ can you put yellow in yours to make it look like mine/
P: well where is yellow at/ right 'here/ (reaches for cut out)
T: try it/
P: (places cards together)
T: does yours look like mine now/
P: that goes down here...cross here (pointing to cut out)
T: see'/ I have yellow inside and green on the outside and you have green on the inside and yellow on the outside/
P: (uni)
T: yeah/
P: (uni)
T: let's see/ that one doesn't work very good/ can you try a different yellow one/
P: (picks up yellow solid puts with cut out) now I have/
T: now you got it/ don't ya/
P: (nods yes)

TABLE 4

MEAN NUMBER OF DESIGNS CORRECT

ON INDEPENDENT PERFORMANCE

Assessment Group	X	t	p
Static	1.15		
Graduated Prompt	2.00	-1.89	.05
Static	1.15		
Mediational	2.95	-2.08	.05
Graduated Prompt	2.00		
Mediational	2.95	-1.93	.05

TABLE 5

MEAN TRANSFER SCORE

AT POSTTEST

Assessment Group	X	t	p
Static	46.84		
Graduated Prompt	47.57	-.16	NS
Static	46.84		
Mediational	57.44	-2.58	.01
Graduated Prompt	47.57		
Mediational	57.44	-2.87	.01

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2. Reprints can be obtained from Susan Burns, Alcee Fortier Building, Tulane University, New Orleans, Louisiana 70118.